

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

FEB. 4, 1952

50 CENTS



## America NEEDS Its Private Aviation

**I**N times like these, civil aviation is an all-important part of the defense effort. Company-operated planes save valuable executive time—provide emergency liaison between production units—speed key men to conferences in Washington and elsewhere.

In peace or mobilization, civil aircraft play an important role in everyday fields, too—

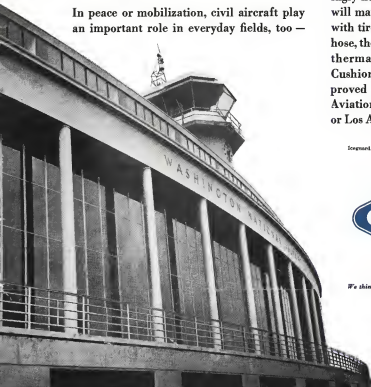
crop dusting, seeding, power line patrol and other vital services—saving valuable time and promoting efficient use of available man power.

That's why Goodyear—in spite of its increasingly heavy contribution to military flying—will maintain its services to private aviation with tires, tubes, wheels and brakes, aircraft hose, the Cross-Wind Landing Wheel, electrothermal Iceguards and Airfoam Super-Cushioning. For information on any of these proved Goodyear products, write Goodyear, Aviation Products Division, Akron 16, Ohio or Los Angeles 54, California.

Iceguard, Airfoam—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio



We think you'll like "THE GREATEST STORY EVER TOLD"  
Every Sunday—ABC Network



...from **STEM**

...to **STERN!**

## The Boeing B-47 *Stratojet* Bomber is equipped with **ZENALOX®** parts by **ZENITH**

The Boeing B-47 *Stratojet* is the world's first bomber designed with swept back wings for extreme speed, thus utilizing a historic revolution in transportation aircraft design.

ZENITH has answered the call to contribute its specialized experience in R.P.\* parts, even tied to the Air Force production program of this and other great ships, by a substantial expansion of the ZENITH plant.

These plants designed exclusively for

the production and fabrication of reinforced plastics, not only offer a complete dual machine equipment installation, but the services of a research, experimental and engineering staff for the development and improvement of all parts produced by this method.

For quotations or cooperation, communicate directly with:

**ZENITH PLASTICS CO.**

GARDENA, CALIFORNIA

**R.P.\***  
REINFORCED  
PLASTICS

Other aircraft  
equipped by  
**ZENITH**  
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At New Departure . . .  
Your bearing's performance  
is tested and proved  
before you use it



Considering the big part ball bearings must play in the efficient operation of your machine, it is important for you to know, and in advance, how the bearings will perform.

For example, you need to know what results may be expected from each type of grease under varying conditions.

Supplying you with this information is just one of the functions of New Departure's new and ultra-modern engineering laboratory.

To help you get the answers:

- What is the determining factor of seal bearing life?
- How operating conditions contribute to seal bearing?
- What has the most effect on grease life—speed or load?
- Lubrication relations.

A bibliography, "Grease Lubrication of Ball Bearings," by New Departure's Research & Development and Design, will be mailed upon request.



*Nothing Rolls Like a Ball...*  
**NEW DEPARTURE  
BALL BEARINGS**

NEW DEPARTURE • DIVISION OF GENERAL MOTORS  
BRISTOL, CONNECTICUT



# LIGHTER, MORE RELIABLE ELECTRIC SYSTEMS WITH New G-E Alternators



**Sugged tests of new a-c generators (arrow) under more than actual conditions establish their dependability in service. An outstanding feature of these alternators is their**

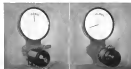
300% short circuit current rating. This provides a safety margin to insure operation of the line clearing device and gives positive short circuit protection.

## 300% Short Circuit Current Rating is Feature of New Line

Savings in weight and space plus greater reliability are natural advantages of alternating current in aircraft electric systems. General Electric offers these benefits in a new line of 4-phase, a-c generators to satisfy nearly every combination of engine, airframe, and loads.

Available either wye or delta connected in a variety of ratings and speed ranges, these alternators meet military specifications MIL-G-6099. Already a large number are on order by various manufacturers in addition to quantities being furnished the military services for both fighters and bomber aircraft.

Whether your problem is a-c or d-c, a single instrument or complete electrical system for a fleet, contact your General Electric aviation specialist, or write General Electric Company, Bldg. 260-5, N. Y.



**30-KW D-C GENERATOR**      **30-KVA ALTERNATOR**

Weight is down 30% with the new alternator, over an equivalent d-c generator. Smaller and slip ring brush wear is negligible in the low current constant or low resistance. Sparking and brush wear of d-c generators under conditions of high altitude and high power output are disclosed.



Nearly perfect sine wave output of the alternator allows proper operation of electronic equipment demanding a low percentage of harmonics in the voltage wave form.

**GENERAL ELECTRIC**

## NEWS DIGEST

### DOMESTIC

Plan to merge Buell International Airways and Mid-Continent Airlines has been agreed upon by the directors of both aircraft subject to approval of each company's stockholders and CAB. Arrangement calls for exchange of one and one-half shares of MCA common stock for one share of Buell's. J. W. Miller, president general manager of MCA, would become a vice president and a director of Buell. The combined system would have a total of 7,562 air dispatched seats and 55 planes.

Personal and executive plane crashes during December came to 48 out of 6,093 flights, and ended, by its companies. Value was \$288,255.

Proposed C-46 freight solution requires a based on various CAA flight test data and theory and even more CAB interpretation of the plan's present status, according to CAB. F. Turner S. Thomas, Senior, about 15 C-46s are presently certified by CAA for air carrier operations—mostly in non-fuel passenger service.

Ben Toren and Fred Del Ruder, and three other employees of Aeradio, Inc. Miami, recently involved in a radio repair firm, were killed when Lockheed T-28s crashed at Miami International Airport, Jan. 21. Toren was vice president and general manager. Ruder was executive assistant to the president. Had been president of All American Aviation (Miami); all All American Aviation) from 1945 to 1946.

Chil plant shipments during November rose to 162 planes, including 117 300 P-47s, and valued at \$10.7 million. Kansas shipped 103, aggregating 141,661 by Ansett plant employment during the month was 754,238, engine plant employees totaled 78,117.

Personal and executive plane ship during the month ended 112, valued at \$11,495,000 for the local year ended Sept. 30, with earnings of \$83,971 after all charges. Coast's a backlog at that time was \$24 million.

Two men were sentenced in District Federal Court for Air Force procurement violations. Lawrence A. Korte, 34, was sentenced to five years, to one co-conspirator, and Fred S. Korte, 35, was sentenced to five years, to one co-conspirator.

of six, to one co-conspirator, Korte, former consulting officer in the Procurement division of Wright Patterson AFB, had pleaded guilty. Korte, electronics company official, Korte was sentenced to five years, to one co-conspirator, Korte was sentenced to five years, to one co-conspirator.

### FINANCIAL

Aeradio Closing House: Interim balance for December showed backlog at \$22,998,476, a 12% gain over the same month in 1950.

Beech Aircraft Corp., Wichita, has voted the regular 20-cent quarterly dividend to shareholders at record Jan. 15, payable Feb. 15.

Bell Aircraft Corp., Niagara Falls, N. Y., has received stockholder approval of a two-for-one stock split and will increase the total authorized 51 per cent increase to 1,284,000 shares.

North American Aviation, Inc., Inglewood, Calif., reports net sales and other income of \$17,672,354 for the third year ended Sept. 30. Profit after taxes and other charges was \$5,671,612. Earnings at Sept. 30 were \$571 million.

Northwest Airlines showed a \$1,665,135 net profit at the close of 1951. Total operating revenues for the year totaled \$49,914,195.

Canadair Ltd., Montreal, Quebec, Canada, has declared a special 50-cent per share dividend, both payable Feb. 27 to holders of record as Feb. 15.

United Air Lines has declared a 25-cent dividend on common stock, payable Mar. 15 to holders of record as Feb. 15.

Air Associates, Inc., Tottenham, N. J., reported a net income of \$11,495,000 for the local year ended Sept. 30, with earnings of \$83,971 after all charges. Coast's a backlog at that time was \$24 million.

### INTERNATIONAL

Certificate of Amherst has been awarded the de Havilland Comet transport aircraft by the British Air Registration Board. It awarded the first government certification of a transport powered commercial jet transport.

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## WHO'S WHERE

### In the Front Office

James W. Casanovi, former vice president general manager at Lockheed Aircraft Corp. in Marietta, Ga., division has been designated vice president there, with David J. Hughes named general manager. Other changes at Marietta include: Harvey K. Campbell to staff advisor in the vice president and general manager office; USAF contract negotiations are completed. First to be in the front office, A. C. Robinson is director of financial operations, Charles B. Jones is manufacturing manager. Jones formerly headed manufacturing operations at Boeing Wichita.

### Changes

John R. MacLean has been appointed director, development contracts, for Ford Instrument Co. division at Sperry Corp. and John A. Barrett has been named director of sales general contracts.

Marshall B. Kaufman has been designated as chief of Ford of New York Aircraft Division's Aviation Properties Bureau (Department of Aviation Development). R. Dean Spence has been assigned by General Electric Co. to take charge plant construction.

Thomas D. McConen has joined Goodyear Aircraft Corp., Marietta, N. Y., as chief development engineer.

James H. Morgan and Donald W. Cook have been named director of material and director of industrial relations, respectively, for General Control Aircraft Co., Cleveland, Ohio.

Clinton R. McKinnon has been appointed industrial representative of R. F. Goodrich Co.'s Aeronautical Products department.

Raymond G. Dugan has joined Douglas Aircraft Co., Dayton, Ohio, as purchasing agent.

William H. Taylor has joined Transcon Products Inc., Cleveland, as general sales manager.

R. F. Dugan has joined Goodyear Aircraft Co. as material sales division at New York City.

Michael N. Cronan has been named job relations administrator for Pratt & Whitney Aircraft Co., Clinton, N.Y.

Philip D. Sherrill has been designated chief of flight test engineering department at Hughes Aircraft Co., Culver City, Calif.

Robert J. Fathallah has joined Ford & Harris, Inc., Cleveland, as staff engineer.

Thomas Adams has been appointed representative of passenger service from Pratt & Whitney.

John Kinkade has been named sales representative manager for Philippine Air Lines and will make his headquarters in Manila.

Sue Dillmore has been named assistant to director of public relations and advertising for Chicago & Southern Air Lines. R. A. Hosen has been named international sales manager for CAS.

## INDUSTRY OBSERVER

As forecast in Aviation Week (Oct. 29, 1951, p. 16) McDonnell Aircraft Corp. finally has received an Air Force production contract for the transport airplane, Douglas X-35A which is in production line will be designated F-101. Development of the transport X-35A is still being developed, and at the same time one of the latest, outside of pure research, the F-101 is expected scheduled for immediate orders, due in large part to Army sponsorship of the craft for its close support capabilities.

As Air Force designations of F-100 goes to North American's new development of the F-100 Super Sabre. The F-100 has a 15 deg. sweep, which led to the company designation Sabre 45. Production Sabres have 35 deg. sweep in wings. The new F-100 is a scaled up version designed to take its considerably more powerful Pratt & Whitney J-57, rapidly becoming the latest American jet engine on the line of current production.

A new experimental sweeping principle for USAF jet fighters has shown an evaluation tests two to four times the number of lifts obtained by straight wings now in use in Korea. High altitudes, of the new night is pointed up in the fact that current equipment is confined in a large degree for USAF's high speed against the MIG-15. The new design was developed by GE as a lightweight defense version of a Navy anti-aircraft aircraft. Evaluation of WADC assessment engineers over the new night, however, has not yet persuaded Pentagon officials to change current production commitments for current design.

Although Army vehicle procurement in fiscal 1952 is faring well enough, with deliveries extending into calendar 1953, Army seems not a shuffling in the 1953 budget which will seriously set back their program for making Army transportation more efficient. They get only \$36 million for procurement as compared to their request for \$245 million.

First Sikorsky Army H-19 cargo helicopter has been delivered at Ft. Rigg, N. C. There are 36 additional H-19s on the Army order.

Boeing engineers have just added an Britain's new all weather jet fighter program will go to the Hawker Siddeley for its 116 all weather planes, and a later batch to Gloster for the more radical G-55 night wing plane. The Gloster craft is wearing a transparent hemispherical tail (quadral), to be discarded later (all gas will). Observed on the day wing Gloster which was built by the Siddeley Co. on its own production, but has obviously got potential. No tangible production from other program is expected before 1955.

North American Aviation has rolled out its first Colossus-built plane at the former Curtiss Wright plant, which it has acquired for the last several months. It is the new A-1J Super Gnat reconnaissance plane. Place is a development from the A-1J and is not to be confused with the subsequent development of the same airplane, the X-21A which recently made its first flight at Los Angeles (photo on picture page p. 5). The photo plane, designed by John H. Doolittle, Jr., is a two-engine, dual A-1J aircraft. It has a tail vertical stabilizer, dihedral has been removed from the horizontal stabilizer, and cockpit has been rearranged. Vertical stabilizer folds to right, and wings fold up and forward to permit efficient handling. Powerplants, like those of the A-1J, are an Allison J-35 turbojet in the tail and two wing-mounted Pratt & Whitney R-2800 piston engines. It is equipped with a speed of approximately 425 mph.

Despite the current general shortage of aircraft engines, Air Force has 10 powerplants for the first F-100s X-114. They are Pratt & Whitney R-2100-114 rated at 1,500 hp. each. The R-2100 engine was developed in a replacement for the Pratt & Whitney T-3500 engine in the Douglas C-54 and DC-3. The idea was to convert the improved performance, but the engine never to produce plans with such more powerful engine came too late and beyond the R-2100. Air Force bought 10 and 50 more were produced by the in the second series.



## Passenger Fatalities in Scheduled Domestic Service

	1998	1997	% Change
Passenger miles flown	3,852,621,000	10,500,000,000(1)	+26
Accidents resulting in passenger fatalities	4	-	+4%
Passenger fatalities per 100 million passenger miles	96	142	+48
Passenger miles flown per passenger fatality	1	3,437	+37
Passenger miles flown per passenger fatality (all types)	87,000,000(2)	74,000,000(1)	+17
Fleet sizes (all types)	343,159,884	389,018,627	+41
Total deaths (all types)	118	172	+46

NOTE: (1) Fatalities  
(2) Approximate

Source: Aviation Week table based on CAB figures

## U.S. Airline Crash Fatalities

	Fatalities Controlled	Fatalities Occupants
1952 (to date)	0	23
1951	0	251
1950	2	145
1949	6	176
1948	0	185
1947	1	292
1946	—	180

NOTE: Includes fatalities from unscheduled and scheduled airline crashes in U.S. in 1946 to date.

\*Elkhart, \*Minneapolis \*Seattle S, Detroit 1 \*Seattle.  
Source: CAB

conference at the Wagon Club in New York last week to replace what is being said will be those about state and federal support.

But it looks as if there will be more ad hoc inquiries for some time to come due to continued aerospace-related and several official investigations started in the crash weeks.

■ **Elkhart's move** has delayed New Air Airport main area.

■ **Four congressional resolutions** have already been introduced urging Congress to investigate the crash and the Newark Airport situation generally.

■ **Some news writers** have charged that both Newark and LaGuardia Airport operators are in violation to local safety and security.

■ **The N.Y. Journal-American** even

ran headlines entitled: Tests Show 2 Crashes Airports, Newark, LaGuardia, says 'Safety Not Safe' on New York City. This report apparently based on a congressional-sponsored judgment after a CAA-authorized demonstration flight over the approach patterns for Newark and LaGuardia.

■ **CAA's Aviation-70**, set the record straight in this and other accidents. CAA Administrator Charles F. Housh made a statement to the press next day.

■ **Mr. Housh** has been directed by certain statements regarding the status and landing procedures at airports in the New York area. The statement ending the approach procedures at LaGuardia, Newark and Idlewild Airports all went into the Civil Air Regulations and the safety program developed

by CAA for the safeguard of aircraft landing, or taking off under instrument conditions. The safety program regulations will undergo only slightly to all locations with the U.S.

Meanwhile the New York Test Authority announced that a study of the crash, around 100 U.S. cities, revealed that 45 cities have instrument areas near the airport runway than does Newark Airport.

A congressional investigator returned from the Elkhart, issue last week gave his report. Local residents and some local officials are in a highly emotional state. However, cooperation between CAA officials and city officials on the crash investigation is good.

■ **Congress** Chairman-Lord officials took to the atmosphere panic as Newark Airport control center reported operations in fact, Newark and Idlewild are scheduled to become the two main airports of the New York Metropolitan area. The move as which the American Council was approaching when it crashed is the only one possible for the normal operation operation until the new north study runway is completed. Notice of the two fatal crashes in Elkhart was in air way the responsibility of Newark Airport was reported the investigation conducted.

■ **Seck** Council-U.S. and several qualified government official participating in the Council crash probe at Elkhart told Aviation Week that most of the possible causes for the accident suggested either had been ruled out or are going through investigation. The investigation is continuing this week and he said he knew the crash was in the cause will be turned up at a public hearing to be held at Elkhart about the middle of February.

It was said that the plane was flying at a low level at the time, was under control, heading through the runway "cut" below it and out of control. The pilot was on instruments, he added.

Investigation at the scene showed both pilots to be in the right path and that there was "a principal amount of power at the time of impact," he said, indicating there was no engine malfunction.

There were some important points under investigation, he said. One of these was "a possibility of an engine on the edge of a wing might have been damaged by a goose low in the investigation is complete on the first accident, he added.

■ **Four** Council at St. William-Plan City 16 to Jan 22, five major airline crashes, three fatal, occurred in the New York area.

In addition to the Council crash at Elkhart, the crash was in 1946, the Council, Newark and Idlewild Airports. Newark and Idlewild Airports Council reportedly flew into the water

fell a mile south of the runway during instrument approach, some of 10 about 100 ft. The crash, Dec. 29, Little Rock, N.Y., a Cessna 441, flying at 40 ft. from the ground, killing 16 of the 46 aboard; Dec. 16, at Elkhart, N.J., a Mirror Airlines C-46 crashed a few minutes after taking off at Newark Airport, killing all 38 aboard.

All four airlines whose planes were on the crash had good safety records. American Airlines had flown over 4.5 billion passenger miles with out a fatal until the Elkhart crash. And it was the first fatal accident of a Convair Learjet, which had flown over 3.1 billion passenger miles. Northwest Airlines had and still has a record of no fatalities. Mirror Airlines and Continental charter had no fatalities until last December.

## Ford-Chicago Plant To Produce J-37s

Ford Motor Co. will become the second source for the proposed J-37 jet engine. The J-37 jet engine, designed as the powerplant for many of the USAF's top fighters of the future as well as its big intercontinental bombers.

The Air Force decision to put the J-37 into production at the Ford aircraft engine plant at Chicago is expected to mean an earlier start-up of the Ford & Whittle R-4400 Whop Major pattern engine at the same plant. Unofficial sources estimated that the planned production of the Whop Major had been cut back as much as 60% from the peak which had been scheduled earlier. Production for a new production of production of the piston engine, until the J-37 gets into production at Chicago, which may mean two years.

Part of the J-37s are now installed at Boeing's new eight 8.52 unit-continuous burner, undergoing test work on preparation for its first flight at Seattle. Additional J-37s are being sent to General Electric's plant at Elkhart, the night jet receiving development of the J-36.

Ford is expected to subcontract a considerable part of the production assemblies for the J-37 and much of this business undoubtedly will go back to the Detroit area, which is planning for additional defense business to replace its automobile plant lines now.

Details of the J-37 engine and its power rating have been held in close secrecy. However, it is unofficially reported that the engine is in the 10,000-hp thrust class and that it is armed with a dual engine.

A Defense Appoint: Scrap for Steel

## New A-Bomber

• **New twin-jet Douglas B-66 for Air Force.**

• **It is modified versions of Navy sweeping ASD.**

The Air Force will get itself a shot at its needed air arm thrust with forthcoming announcement that it will produce large quantities of a new Douglas twin-engine bomber as designated B-66. The plane will be a modified version of the sweeping ASD, Navy's latest and fastest reconnaissance bomber which is slated to begin flight tests shortly.

Although current production of the Navy Douglas ASD had been delayed previously (Aviation Week Sept. 17, p. 13) and preparation for operational service at the time the 57,000-mile current "T-28" is launched, all other details of the bomber have been checked to security.

On Jan. 27, however, Navy released information of a model of the potential carrier bomber. Navy officials disclosed earlier that ASD would weigh approximately 77,000 lb and that it represented about the heaviest and largest type of bomber contemplated by Navy as at present strength. The new bomber will have a crew of three and the Navy version will feature folding wing for storage aboard carrier.

■ **B-66** Douglas-Deputy structural chief of ASD Air carrier operation, Air Force B-66 is expected to be considered as a replacement for the USAF's current bomber.

Although neither version would give rise to serious USAF, Navy and Air Force competition for the new B-66, both versions concerned the bomber could easily carry the same load. Some of the B-66 is 55 ft; length, 80 ft; height, 20 ft. The B-66 is powered by three J-47-J37 engines developing 12,200 hp. Thrust each. Only two have been ordered and both are at Edwards AFB, Mo., Calif.

New version ASD is pointed by two Washington 140 horsepower engines each out as a multi-use aircraft. Present equipment will power the ASD in flight but not take off without afterburner although production versions indicate afterburner installation which will boost thrust to a total 9,500 hp each.

■ **Recent Plans**-Air Force B-66 will incorporate General Electric J-47-J37 engines with afterburner for a total of 9,500 hp thrust each.

Air Force source stated that first quantities of the new bomber would

be produced in B-66 (reconnaissance bomber) configuration although when conversion to bomber version will be started to meet a future requirement. Present plans are that B-66 will utilize the package in cruise type conversion or photographic equipment in various purposes, mainly depending upon mission in the field. This type jet package was developed by Glenn Martin Co. for the Air Force but also about the B-66.

## Airliner Recovers From 2,200-ft. Dive

A test on flight weekend aircraft last week when a Capital Airlines DC-8 above Pittsburgh at 6,000 ft. suddenly went into a steep climb to a 2,200-ft. dive before leveling again.

The cause, a loss of speed of interest on the fabric-covered elevator. For several edges of the strip, a reinforcing band on upper and lower surfaces at the elevator trailing edge, apparently had broken, was caught in the main stream and ballooned out reflexively to create a pocket with enough drag to set the DC-8 to stall.

Since a typical pocket now raised on the trailing edge of the bottom-50 ft. on about 40 ft.—the top might have been. This pocket and held the elevator down, causing the nose-down attitude.

The maximum finally tipped off the strip pockets and the craft flew normally to a landing at Cleveland.

## Subcontractors Help Bendix Carry Load

The 563 million shock of defense contracts on Bendix Corp.'s books at the end of fiscal 1951 will be spread out among its more than 6,000 subcontractors and suppliers to the tune of \$171 million worth of contracts, with \$112 million of those going to small businesses.

The firm, which sells hundreds of components for aircraft and related equipment, notes that its defense business has increased by 77% of its sales volume in the final month of the fiscal year just ended.

## Switch Services

Push to let down the bars for military personnel who want to switch services is on again. At Defense Department's request, Chairman Richard Russell has introduced legislation authorizing transfer of the service of the military's service members.

Most transition probably would be from Army and Navy to USAF—which needs officers for its expanded program

# MiG-15 Dims USAF's A-Bomb Hopes

(Editor's Note: There is growing alarm in the Far East over Postnatal post-pooling of Korea and Korea's responses, and the following story from AVIATION WEEK's correspondent at Tokyo points up some reasons.)

By A. W. Jessup  
(McGraw-Hill World News)

Tokyo—Can the U. S. Air Force deliver the atom bomb to an enemy homeland?

Developments in the air war over North Korea in the last six months bring this question to the fore. This newspaper's latest issue issued by Far East Air Force (FEAF) bases in Korea, Japan and Okinawa turned up some serious doubts. Certainly, the capability of one bomber alone to bomb such a target is highly doubtful. It was just to the Korea War. Perhaps the best hope for a Japan job is a successful, one-time atom attack.

✽ **Scissors Double-Bomber** experts believe they can cover most strategic targets, against which they might be engaged in the War zone. But they consider it will be the most difficult task was anticipated a year ago and their confidence of reaching the target area is more than offset by possession over the chances of returning from such missions—even in the B-36.

Two months ago, primarily because of this little published but potentially shocking possibility of what was considered the free world's biggest deterrent to any night Russian aggression. One is the performance in high speed jet interception against constant bomber attacks in jet fighters. The other is the new night which MiG-15s recently chased an RB-47 to 150 mi., continually making passes at it.

Well known is the story of the MiG-15 against the B-29 in October. Victorious as by GCI radar, the MiG swept through an F-100 screen to hit the B-29 before the Sabers could take effective defensive action. In early December, the F-100s under Col. Benjamin Franklin, commander of the 4th Fighter Interceptor Group, chased the same target against a flight of 12 Communist bombers of the TU-2. The F-100s made two passes at the bombers before the MiG-15s even dropped flares and any external fuel tanks.

✽ **AA-GM Theory-A** few years ago there was an Air Force theory proposed that a bomber with a Mach 55 engine would be the answer for the future. It was assumed the atom bomb would provide sufficient protection to that the best an interceptor could hope for was one pass at the bomber. Then the distance between the fighter and the bomber would be so great, and the fighter's maneuverability and rate of climb, because so difficult that the bomber could go on as was. The MiG exploded this theory.

Take the RB-45 experience for example. It can hit MiGs above 35,000 ft. and brief diving nose to peak speed. It hit its Mach 5 in less than 4,000 ft. and had to level off. For the next 150 mi., the MiG kept "ping-pong" around it. While the MiGs didn't shoot at it, down, they proved that the MiG at least has no difficulty keeping up with a jet bomber. Granted the RB-45 is not below Mach 55, the one which the MiG attacked leads to the conclusion that it can pass on about the same performance against a Mach 55 aircraft.

That threat to America's atom-bombing capability more than anything else was responsible for the stirring story

recently issued by AF Chief of Staff, Gen. Hoyt S. Vandenberg following his November trip to the Far East. Via daylight drive out to jump off on the FEAF's bomber campaign for hitting the MiG drive the B-29 out of the Korean daylight. He will discuss the U. S. night jet effort to hold its atom-bomb advantage, and if and when Russia strikes.

✽ **B-36 Second Purpose**—Today, the only jet atmosphere in that any bomber could below Mach 55 is well on the way to development. It furthermore, is probable that within five years the only way of carrying out such atom-bomb attacks on a continuing basis as opposed to one-time attacks, will be by greater numbers of jet or supersonic bombers.

Lost the steps here "we told you as all along," the newspaper. Surely, the B-36, although it may be obsolete today, was likely hit toward its purpose. Above everything else, it is the War's weapon which Russia had most and which it developed the MiG-15 to stop.

Also, the B-36 will have the possibility of carrying out at least a significant atom attack. Striding from a wide range of bases and striking night cover for the final run to the target areas, there is a good chance that enough B-36s would get through to cripple serious Russian centers. But it is a shockingly obvious waste of resources that so could even be continuing such on the three-week schedule thought necessary and feasible.

Some estimate of this possibility is the enormous effort the Government is now making in North Korea to perfect night interception tactics. So far, no serious steps have shown up. But the Reds and up 41 types of fighters, including MiGs, in last night mid-air B-29s.

GCI radar is used to bring the fighters into range of the bombers, and radio-controlled searchlights illuminate the bombers for visual firing passes.

✽ **Parasites—An** intense method of delivering atom bomb attacks, prior to the development of immense bombers or guided missiles, may be jet fighter bombers. These could be loaded with 10 to 20 B-36s to allow striking range of worldwide targets. They would be sent there under a fast, high-altitude run to the targets, drop the bomb and return to a pickup point for ferry loads to home bases.

But this method has some weakness. To get within fighter-bomber range, a B-36 to 700 mi. of the target, the ferry-bomber would have to pass over a considerable part of enemy territory.

Night bombing techniques by radio and other electronic methods in Korea have produced no effective, and often more effective, results than visual bombing of lesser targets such as bridges, air fields and marching bands. These are about the only medium bomber missions in Korea, excepting the frontier at least bombing of enemy troops and supply concentrations.

Daylight formation bombing often is the least efficient method of hitting such targets since any error by the lead ship becomes an error for the whole formation. Night bombing is said to give every B-29 its individual chance to be on the target.

The drawback is trying off in the training of better bomber crews for night and bad weather bombing. Thus, it has improved the chances of success for the one-time attack which we may have to make against Russia with B-36s, B-50s and B-29s.

## Canada Makes Major Aircraft Purchases

Canada purchases of 268 U. S. jet fighters and 28 additional U. S. built Douglas C-47 transports.

Military orders placed during the last six months for aircraft and weapons being built in Canada 100 North American fighters, in production under license by Canadian Car and Foundry Ltd. at Ft. William, Ontario, 534 Lockheed T-33 jet trainers, in production under license by Canadair, Ltd., 17 de Havilland Chipmunk trainers, in production at Toronto, and 990 Rockwell Navy jet engines which will be built at a new plant near Montreal.

✽ **Flies for Britain**—The Canadian production report to Parliament in Ottawa did not include previously reported contracts to buy Canada Ltd. for approximately 300 CF-100 two jet engine fighter fighters, not included in Canada Ltd. for a large quantity of North American licensed F-86 jet fighters.

The Canadian government is reported to have agreed to send over to Great Britain 100 CF-100 fighters of F-86 aircraft, complete with RCAF

✽ **Other Orders**—Other aircraft purchases, not closed in military by the U. S. and negotiated for primarily by the Canadian government, included 11 Sikorski H-35 helicopter for search and rescue operations, 1 light B-10 helicopter for use by the Royal Canadian Navy, and 100 Rockwell Repriser (C-47) transport over trainers.

Military aircraft purchases made by

the Canadian government in Great Britain (see dollar contract news developed) included: 3 Bristol 107 fighters; 2 de Havilland Foxjet jets for high priority transport and 20 surplus Douglas C-47 transports.

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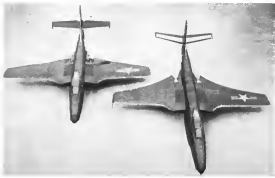
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The Canadian government is reported to have agreed to send over to Great Britain 100 CF-100 fighters of F-86 aircraft, complete with RCAF



NAVY GETTING BIGGER McDONNELL BANSHEE

First photo is to be used as the new, high-Mach Banshee. The Banshee shown (right) with other F-100s, providing a comparison. The Banshee shown is believed to be "completely prototype."

indicating that production version now at the works will show some changes. It appears that considerable amount of the new engine was installed. The Banshee shown is believed to be "completely prototype."

located but, with detailed has been fitted. Other new features include heavier armor (possibly Banshee have been 25 mm cannon, increased fuel capacity and improved radio installation.

## LETTERS

### Stall Warning

to 104. American West moved ahead steadily, using the aviation industry to take steps to enhance the ballasted through the use of stall instrumentation. Since that time, there has been much progress in the field. Most airlines and armed services aircraft have been equipped with pre-stall warning systems. In addition, the acceptance of pre-stall instrumentation has resulted in the use of multiple stage detection for pre-stall speed control for the landing approach and extension of at least.

We point with pride to the record that we have achieved in the field and in particular to the presentation to us by the Flight Safety Foundation of the 1960 American Wreck Air Safety Award. We also point to the excellent safety record achieved by the almost 20,000 operations which have been made on every type of air-

When it comes to safety equipment, the most progressive factors of the country's motor industry should be the transport sector manufacturers. Safety is the most important factor of public transportation.

The economic value of a good safety record from the standpoint of public safety (and the protection of valuable equipment) is well known. Therefore it is not surprising that, as mentioned in your Sept. 17 Air Transport article by F. Lee Mason, transport aircraft manufacturers feel the CAA and the ALPA are acting in an "ulterior" fashion by coming out positive, but not just-the-way. Do they feel that as others should be taken about the frequency of occurrence of accidents of transport category aircraft involving staff? There were 15 such accidents many fatal, listed by the CAA during the period of 1940-1941.

We do so in that article that dangerous and precise pre-stall warning requires the contribution of post-stall warning contraindications which is not disposable under all normal flight conditions. We should like to point out what problems there is to implement this idea. The first problem is that the aircraft manufacturers who presently are using pre-stall warning systems have done so without first satisfying themselves as to the reliability and performance of the equipment.<sup>1</sup> The second speaks for itself.

WE HAVE NEVER CONSIDERED THE INSTALLATION OF A PRE-STALL WARNING SYSTEM IN OUR TYPE OF AIRCRAFT, INCLUDING THE PRE-STALL WARNING, WHICH WAS NOT NECESSARY, AND APPROVED BY THE AIRCRAFT MANUFACTURERS.

Of the transport category already on which our equipment has been installed (the Grumman Mallard, Northrop G-115, Douglas Super DC-1), and the Cessna 240 there is only one on which the installation has been partially discontinued—the Cessna 240. Let us look into the reasons why. A Cessna 240 was landing whereupon due to failure of the pilot to extend the landing gear. The pilot later stated he thought the landing gear lever (which consisted of the outer approach) was the still means he

This is a poor screen. How are the facts presented in the introduction?

- The landing check list was not followed
- The gear-down advisory was not moved
- The check list for gear-down inspection was not followed
- The landing gear horn was ignored, whether it be landing gear or stall warning
- The stall warning alarm was not a horn—it was a bell

Did the resulting downgrading of the post-still alarm to read "craftman" justify the lack of such a valuable system when a later Cessna 240 accident occurred because a pilot used the flap on a single-engine aircraft?

Those familiar with pre-stall warning systems know that the raising of flaps will cut off the pre-stall alarm when the airplane is at high lift. This is because the pre-stall detector, unlike the winged redaction, operates on pressure to maintain lift and is affected by flap position. As to stall warning signals, the armed services specify a stall mechanism including a device which is activated by the detector and supports the aircraft a simulated pre-stall buffet. This signal cannot be "tricked" with any other alarm.

The art installation industry should welcome the recommendations of the GAO and the Art List Policy Team for positive and increasing income specified luxury taxes that will in fact achieve the most effective safety improvement now available.

L. M. GARDNER, President  
Safe Flight Investment Corp.  
+ Water St.  
White Plains, N.Y.

### Doman's Ceiling

Thank you for the fine article and picture layout in the *Demon* September issue. I fly out in a job to test technical water, diving, water, wind, and the information and presented it without finding any of the technical points. However, your presentation has arranged to have the correct class at 1,300 feet per minute to 12,000 feet which we must certainly say it would not be technically that obviously it just one aspect too high for even our sales Department to discuss a class.

Clark Macintosh, Sales Manager  
Douglas Harbington, Inc.  
Muskegon Airport  
P. O. Box 551  
Deshler, Conn.

**From a Wife**

### From a Wife

My husband is an inspector for Pan American World Airways and has taken and enjoyed your magazine for years. I often glance through it and read some of the articles and the editorial comments.

Sometimes you're recommended to don't something about sailing planes more quiet. It is a very good idea and one that really needs to be worked on. Here in Florida where windows and doors are always open there is constant pressure, noise is

Yare volunteer groupings offered in the Dec. 10 issue is a last shot. Where the list of ideas can see that?

Mr. A. P. Beerna  
11620 N.E. 30th Ave  
Miami, FL

## Eskimos &amp; Milk

You can have your pollster belly about milk-stained Ekman lips. It all had something to do with Aaron Hirsch and his *Mr. Townsend Associates*.

[illegible]

- There is plenty of available omega-3s at extremely low costs to Alaska today on FAA. On milk it is 14 cents a pound for minimum shipments of 100 lb. Typical transcontinental rates are 21 cents a pound.
- Last week two of three major stores in Portland had a price war and pure omega-3s from local sources dominated the shelves.

- There are no transport problems
- *Edimur* has plenty of milk in anyone else in the store and plenty of milk if available if they want it. Some of them don't want it. This is an educational difficulty rather than a transport difficulty
- This week *Pachoda* grocery stores are having a one-day sale on brown and white, celebrating the fact that there are no shortages of transport
- The soukials have never as far as we have been able to determine earned milk in Shikha in any event. Five American World Airways for the past four years, has been the only low-cost milk store.

John Carson  
News Editor Manager  
Pan American World Airways System  
115 End Blvd St  
New York 17, N. Y.

## Praise

We would like to have your permission to reprint the article on Northwest Airlines which started on page 55 in the Dec. 18 issue. We would like to use this in connection with Hydrex for our client Hydrex Air.

John H. Reisman  
John H. Reisman Co.  
805 South Lucas Ave.  
Los Angeles 14, Calif.

ONE OF A SERIES

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## Army's first transport 'copter carries its loads on 28 TIMKEN® bearings!

USED successfully in the Navy, the Pave III MUP will soon be in the Army as the H-25A with main power, loaded up flying, cargo in down and provisions for at least three lives. To help insure smooth, dependable operation in the air and on the ground, the H-25A uses Timken® bearings in the fuselage and transmissions, in the pitch bearing arms and in the landing wheels—a total of 28 Timken bearings.

Timken tapered roller bearings keep this in perfect alignment even

under the heaviest loads. Their special construction corrects radial and axial loads with minimum deflection and permits accurate pre-loading to any desired degree. They permit smoother gear mesh and reduce wear.

The rollers and races of Timken bearings have a hard, wear-resistant surface and a tough, shock-resistant core—especially important in landing wheel applications. Close contact between rollers and cones provides maximum load-carrying capacity. And due to their incredibly smooth surface

both Timken bearings practically eliminate friction.

Timken bearings are first choice throughout industry because no other bearing gives you all the advantages that Timken tapered roller bearings have to offer. Invest on them on all the equipment you build or buy. Look for the trade mark "Timken". The Timken Roller Bearing Company, Canton, Ohio—Canadian Plant: St. Thomas, Ont. Cable address: "TIMBROSCOP".

The model is a tapered roller bearing made in U.S.A.



**PAVE III HELICOPTER COMPOSITION** uses a total of 28 Timken bearings in the transmissions, pitch bearing, rotor and landing wheels of their main power (H-25A) helicopter. The result is smooth operation and long life.



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## AERONAUTICAL ENGINEERING Diesel Power Proving Out in Aircraft Use

- Cylinder head air cranks out peak firing pressure.
- Fuel economy, reduced fire hazard claimed.

By David A. Anderson

A new aircraft Diesel engine, with a novel design feature which avoids high peak firing pressure, has been developed by Diesel Power, Inc. of Bridgeport, Conn. The engine is currently being flown in a Taylorcraft liaison plane. And Taylorcraft, Inc. has made extensive arrangements with DPL to use six engines built, up to 500 hp.

L. M. Burton, DPL president, says that the design of an air cell in each cylinder head makes his engine run smooth and without sharp peaked firing pressure.

The new engine is of 290 cc in displacement and is equivalent to the Leorning 3200 D in made by Leorning-Spencer Div. of Avco Mfg. Corp.

On a basis of weights and horsepower, there is no choice between these two engines.

Crude fuel consumption of the Diesel is about one-half to one-third that of the gasoline engine.

**Quick Review**—The significant difference between the Diesel and the gasoline engine is the method of ignition. The Diesel requires no spark plug, and depends on compression to raise the temperature of the charge air above the spontaneous ignition temperature for the fuel.

Work, which is required, is peak compression, vapors and gases (gas) naturally on contact with the heated air.

The advocates of the Diesel engine generally emphasize the fuel economy (first), the reduced fire hazard (in the case of a crash) (second) and the low cost of fuel (also important).

Those who argue against the Diesel generally cite the low horsepower/weight ratio and point out that if Diesel fuel were in great demand, the price would be right up there with aviation gasoline.

Barton's big argument is that you get two in three when the used engine on one filling of the tank—and that's because the volumetric heat content by high-density Diesel fuel is lots more than that of gasoline.



MOUNTED on an Army type Taylorcraft, modified Diesel engine is run up for test.



CLOSE-UP shows simple installation. Note absence of injectors, plugs, wiring.

**Differences**—Big difference between his engine and the conventional Diesel, says Burton, is that his engine burns all the injected fuel. Most Diesels have a "knock-off" at the fuel injection which does off and return to the main fuel supply any excess fuel which has not burned.

And in addition, he uses an air cell in each cylinder head. This cell is so designed and located that fuel does not enter it. No burning takes place in this cell area.

But this design, according to Burton, . . . provides a rapid succession of power pulsations until all of the oxygen (the cell) had contained is exhausted.

What results is another running, and the absence of a high peak firing pressure.

This high firing pressure has made Diesel designers overly heavy construction in the past.

Says Burton, "That is why our . . . principle is adaptable to lightweight, stressed aircraft engines where the aluminum cylinder head is usually threaded and skewed to the steel cylinder burst."

**Coverage**—John A. Leorning, 3250 engine furnished the basic design for the Diesel engine. The powerplant came from a target plane which had been cracked up, so other engine was

available at the test development started.

Barton underlines the statement that the test is not intended as a comparison. The licensing was used to give principles in a convenient form set out to show that the Diesel cycle, as modified by his firm, could be applied to a lightweight aircraft engine without any changes in basic design of bearings, connecting rods and other mechanical parts.

DPI designed a cowling pattern to encase the compression ratio. And they designed and built new heads for the cylinders.

The engine was taken from the test

stand and installed directly in the plane. Consequently none of the test design refinements have yet got on the flight article.

One example is the use of ordinary rubber hose for the fuel supply lines. These are bulky and would normally only be used as test stands. A combustion chamber was mounted on the rear end of the drive shaft for production light engines, a conventional electric starter will be used.

**Test Purpose.** Object of the current flight test at Pittsburgh is not to test the engine, it already has 1,700 hr. of operational time. Instead, Barton is accumulating data on fuel consumption

## Specifications

- Number of cylinders, op. 1-cyl.
- Fuel 40
- Stroke 12
- Bore 1.6
- Horsepower at 2,400 rpm 100
- Revolutions at 2,400 rpm 875
- Approximate weight (dry) 245 lb.
- Compression ratio 14 to 1
- Fuel injection pressure 1,700-2,500 psi
- Fuel injection pump Each 4-4
- Ignition source, spark spray holes 100
- Starter 100
- Displacement 290 cu in.

with a wide variety of fuels and blends which are commercially available.

As one result of the test program, fuel consumption reductions of at least 50% have been shown. For example, the Lycoming 8-290 uses about 9 gph. at cruise. With constant leverage, the Diesel conversion uses about 4.5 gph., and with a heavier common Diesel, had been shown a consumption as low as 3 gph.

Another interesting result has been the lowest cylinder head temperature. No. 1 cylinder—which in the Lycoming ran at high as 425° to 450°—stayed down around 310° in the Diesel the test showed.

These tests have confirmed that DPI's modification of the Diesel cycle has resulted in eliminating the sharp peak firing pressure.

This pressure is now the same order of magnitude as the compression-end pressure.

**Two-Year Old—Current status of the engine.** Approximate results of 12 years' experimentation which started with early studies by Fred Thielen, the principle was financed by and assigned to Diesel Power, Inc.

Development of the test engine was completed in 1946, but the past two seasons in various test further work on it.

Diesel Power turned to tank engines and as one result of that change now has a 150-hp. six-cylinder liquid-cooled engine on the test stand.

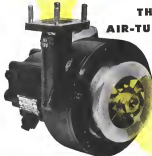
Work on the aircraft engine was resumed several months ago under a contract with Taylorcraft, Inc., which calls for production of a group of engines for Taylorcraft use. Anticipated production during 1952 is 500 units for Taylorcraft.

Diesel Power's headquarters is in Los Angeles, where the automotive engine work is situated.

The firm is also authorized to build and assemble the Taylorcraft plant at the Canton Pittsburgh airport of Cessna, Inc.

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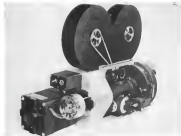


They are typical of the skilled men you'll have working for you when you use Harter as a subcontractor. Particularly if you have unusual demands, you'll appreciate the certified stretch welders and the experience in ingenuity inspection in the Harter production area.

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**NEW MAURER** Servo-Sync camera drive mounted on back of 35 mm motion picture camera

## Servo Drive Puts Cameras in Step

**Analysis of photo data is made easier by device which accurately synchronizes all units connected with it.**

Frame synchronization for films better than previously available is the outstanding feature of a servo-controlled camera drive being manufactured by J. A. Maurer, Inc.

The device, designated as the Maurer Servo-Sync Camera Drive System, was designed by Eugene, Inc., of Kenilworth, Ohio. At present, the device is applied to the Bell & Howell Standard 35-mm. motion picture camera, but it is readily adaptable to many other cameras.

And any number of cameras can be connected by cable (in units on the ground) or radio link (for units in the air), can be synchronized in any relation.

Maurer says that the maximum possible shutter duration is only 210 microseconds at a film rate of 12 frames per second. This is an accuracy of about .1%. Other frequencies produce similar or better accuracy figures.

► **The Problem.** In many jobs of data recording, the measurements show data variations with time. And this time variation is important because it serves as a common base to which all data are referred.

In-focus past, a typical installation such as an aerial photograph would line a clock mounted on it and the image of the clock would be photographed by the recording camera. Then the data would be plotted against the

time shown, and results picked off a hand scale.

The big disadvantage was that instantaneous time records were not provided, and if data from two points had to be correlated, it meant that every point past had to be plotted for comparison.

Synchronous camera drives changed that. Information from a number of cameras can be obtained at the same time—at least, as much as the drive system permits.

And in Maurer's system, that is very

close indeed. A time differential of only 210 microseconds (microseconds are one-thirtieth of a second) between sets of recorded data is low enough to be used with considerable accuracy—excepting some confusion of explanation phenomena, for example.

► **The Solution.** Maurer says of the current Servo-Sync system, it is a Bell & Howell Model 2700 35-mm. motion picture camera. This particular camera is generally known to have reliable operation and accurate frame registration. Its film capacity is either 400 ft. or 1,800 ft. magazine.

Heart of the Maurer system is a control unit which provides all the camera with reference data. The control unit is basically a synchronous motor driving a variable speed drive at a desired frame speed. Drive is through a gear change unit.

Each camera has a mechanical motor and gear unit which approximates the rotation of the control unit. The angular position of the control unit shaft and the camera unit shaft are compared electrically. The error between them is applied as a signal to a servo drive system. Through a differential drive, the error is continuously reduced toward zero.

Radio link synchronization can be provided by other position-control devices. For such a case, all the necessary data can be transmitted over a single channel modulated at radio frequency.

► **Power.** The Servo-Sync system operates on 110-v., 60-cycle electrical current. Power consumption of the control unit is 30 watts, each camera draws 70 watts.

Electrical interconnection requires three wires.

The camera and drive unit, which are a 400-ft. film magazine, weigh about 46 lb. The complete assembly is 14 1/2 in. high, 9 in. wide and 15 1/2 in. long.

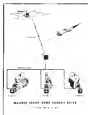
Further information can be obtained from J. A. Maurer, Inc., 5700 53rd Street, Long Island City 1, N. Y.

## Small Unit Checks Noise Spectrum

Just how noisy is your office, or your shop area, or your flight line?

One of the best ways to find out is to make an analysis of the noise spectrum, not just an overall decibel level reading. And one of the tools available for the job is the new General Radio Type 1590-A Octave-Band Noise Analyzer.

G-R's analyzer is recommended for applications where exact detail is not required in the analysis, and where reasonably continuous spectrum noise are





ment. With this configuration, there is lower fuel consumption for the same power of the basic engine, or higher power with the same fuel consumption. Power in cruise increases as up to 20%, it is reported.

First flight of the prototype was on an extra engine in the case of a B-57 flying late, on October, 1949. It first flew in the RVN Neptune in May, 1950.

Considering the relatively small time as the Neptune, the service record would seem to be a good one, because already one complete RVN squad has been authorized to go to 1,000 hr on the engine between overhauls.

Reports are that for a new engine development, the Turbo Compound is relatively free of "bugs" very few troubles having shown up, and there having been no need for design changes had been concentrated in the turbine and but this has been corrected with a new coupling design of the vortex type. The turbine wheels are reported to have given no difficulty through efficient cooling. Wright has brought turbine operating temperatures in the engine down to about 990F and one prospective commercial operator feels that the events will have no problems service life.

■ **DC-7** Figures—Douglas says that the DC-7 for America will have a top speed in excess of 400 mph and a cruise speed of more than 300 mph—50 mph faster than the DC-1. These are guaranteed figures, American says.

The engine, like those in the Super Comet consortium will be the 977EC18M41s and the prop on the DC-7 will be Hamilton Standard low blades, 174 ft in diameter.

The plane will be 43 ft longer than the DC-6B, will accommodate 68 passengers, plus six lounge seats, in the de luxe version and up to 95 passengers in the coach version. Pressurization will afford sea level conditions at 12,500 ft, 5,000 ft. at 20,000 ft. altitude, and 5,000 ft. at altitude of 25,000 ft.

The domestic transport version will have a gross weight of 116,000 lb. and carry 4,512 gal. of fuel. Overseas models will have a maximum takeoff of 122,200 lb. and carry 6,080 gal.

■ **Specifications**—Here are the DC-7 specs:

■ **Dimensions**—Span, 117 ft 6 in.; length, 188 ft 11 in.; height, 28 ft 7 in.

■ **Area**—Wing, including slats, 1,063 sq. ft.

■ **Weights**—Maximum takeoff, domestic

version, 116,000 lb.; overseas version, 122,200 lb.; absolute, design loading, 125,000 lb.; payload, 25,000 lb.

■ **Level flight speed**—With sea conditions, piston, high blower, critical at +10 mph at 15,000 ft. at 22,000 ft., 90 mph; at 18,000 ft. at 22,100 ft.

With main cruising power, high blower, critical at, 370 mph at 15,000 ft. at 24,500 ft.; 398 mph at 18,000 ft. at 25,100 ft.

■ **Stalling speed**—Landing configuration at sea level, 99 mph at 15,000 ft. 100 mph.

■ **Rate of climb**—4 engine max. at sea level, 1,330 ft. per at 15,000 ft., 1,555 ft. per at 101,000 ft., 1,260 ft. per at 136,000 ft.

■ **Cruising**—With main cruising power, 4 engine service ceiling, 26,200 ft. at 15,000 ft.; 26,700 ft. at 101,000 ft.; 26,700 ft. at 116,000 ft.

■ **Endurance**—At 770 power, CAA field length at 8 ft., 5,400 ft. at 15,000 ft.; 4,400 ft. at 18,000 ft.; 5,670 ft. at 116,000 ft.

■ **Landings**—CAA field length at 8 ft., 5,510 ft. at 15,000 ft.

■ **Range**—Absolute range at 18,000 ft., with 4,512 gal. of fuel, 1,625 mi., with 6,080 gal., 3,815 mi. Absolute range at 20,000 ft., with 4,512 gal., 3,780 mi., with 6,080 gal., 3,775 mi.



## We hired an engineer over Berlin

"The Boeing Flying Parts came through a wall of fire and lightning that night to let Berlin right on the nose. I bet never let us down—not then or in any of the wars to come. I can't praise to the old Boeing. Now I'm prouder still to be on the great engineering team that designs the new ones."

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The steady growth of Boeing's Engineering Division over the past 35 years is an index of stability. There's great work to be done in all phases of aircraft design in the fascinating new field of guided missiles. . . in jet propulsion.

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**BOEING**

## new Cohrlastic heating units



Jet engines and other air-bell heavy loads are electrically heated for positive starting and climbing.

**T**he brand new electric heating pad is the work of Connecticut-based Cohrlastic engineers in cooperation with designers at Consolidated Vultee. It is suggestive of the new ways of applying heat to many parts of a plane operating in such climates.

The pad consists of resistance ribbon wire embedded in a specially developed silicone coated fiberglass with high dielectric strength (in excess of 3000 volts). This is embedded between thin aluminum sheets that attach to the device assembly. The resistance is thin and light weight, not over .006" in thickness. It remains flexible and functions at temperatures as low as -80°F and up to +500°F. Normal heat output at 400°F is 4 watts per square inch. Elements can be made with ratings ranging up to 45 watts per square inch on voltage up to 250 volts AC or DC.

Other aircraft uses include heaters for air-to-air ducts, helicopter blades, antenna masts, oil vent lines, in-flight refueling receptacles, engine covers, waste flow antennas. Elements can be fabricated into a variety of shapes with single or compound curvatures. If you will outline your problem, we will carry on from there.

THE CONNECTICUT HARD RUBBER CO.  
614 End Street, New Haven, Conn.

**Cohrlastic**

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FROM: Mr. [Name]  
SUBJECT: [Subject]

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## IAS Summary

- Society hears 48 papers during five-day meeting.
- First group of digests is printed in this issue.

Last week's 35th Annual Meeting of the Institute of the Aeronautical Sciences proved to be the longest and most comprehensive that the organization has yet held. Total of technical papers presented was 48 and the customary five-day sessions were extended an extra day this year—presumably to take care of the volume of papers on sessions.

For the second successive year this technical category has been given top emphasis on the program and at this meeting was broken down into three general considerations—impact of the transonic trends on aircraft design, problems encountered in today's high-speed flight, and off-schedule operation problems. This last phase was the subject of a symposium featuring some panel members, including flight representatives from airlines, the Navy, Civil Aeronautics Administration, Air Transport Association, Sperry Gyroscope Co., and personnel from Cleveland airport.

Another feature of the meeting was a joint session on rocket propulsion in conjunction with the American Rocket Society, indicating that major and major results of work in this field will become available in future test results.

Maneuver flight (maneuver) again was back in the picture with hydrodynamic problems under analysis. This session was held jointly with the Strong Society of Aeronautics, Inc.

Aerodynamics, an important anchor in the external aerodynamics of the Institute, took its usual extensive role with a wide assortment of long-hauler attractions.

The remaining categories included aerodynamics, structures, aircraft design, systems, wing area, hydrodynamic stability in air transport and flight problems.

As a reminder to those in the industry who could not attend the meeting, *Aeronautics Week* began here the same evening of the papers delivered at the technical sessions. Other papers will be briefed in succeeding issues.

### Aerodynamics

► Calculation of the Sheddles of the Laminar Boundary Layer in a Compressible Fluid on a Flat Plate with Heat Transfer. E. J. Van Dusen, Aeronautical Engineers, Aerojet Laboratory, North American Aviation, Inc., Azusa, Calif.

The Convex Method of Boundary Layers

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(Continued from p. 31)

It is concluded that, if the structure is constant and is one of the above three types (also explicitly excluding variable), it can in most cases be analyzed by applying or extending analysis methods now available. Nevertheless, very important work yet to be done is to be accomplished before the optimum engineering solution itself can be developed.

A Method for Reducing the Analysis of Complex Redundant Structures to a Routine Procedure. L. B. Wolfe, S. S. Susskind, and W. T. Lanning, Structures Division, Grumman Aircraft Engineering Corp. A general method is given for the analysis of statically indeterminate structures based on maximum strain energy. Matrix methods are used throughout.

The procedure divides the work into essentially three phases: (1) the writing of the equations which determine the load distribution at the structure after it has been made statically determinate; (2) the tabulation of the influence of the individual elements occupying the structure; (3) the self-checking matrix operation which can be performed in a routine manner. In conjunction with phase (2), formulae and curves are provided for some of the elements used most frequently in obtaining aircraft structures.

The method has been applied at the design stage to various components of several modern aircraft. For the purpose of this workshop along these lines, a simplified example is worked out in this paper.

Load distribution and deformation characteristics are obtained for an elastic structure supporting the rear section of a two-seat wing-fuselage wing. It has operators and chordless type and its behavior is not perfect.

### Motorless Flight

(First Series in Cooperation with The Science Society of America, Inc.)

P-Dyn-O-Quay Sonnet Caters Based on Thermal Strength. B. H. Carmichael, Codd Corp. Aircraft Corp.

The equation for effective cross-country speed is developed in terms of natural air mass selection and the effect on performance of the solution, where the latter is presented and by use of Man's Universal Performance Function. Differentiation yields the relationship between optimum glide speed and the meteorological conditions.

Where optimum glide speeds are compared, the solving speed of lift glide also emerges as the controlling parameter. Further examination of the optimum speed optimum values of the parameter as a function of the meteorological conditions are converted through the aerodynamic system of the solution to yield optimum values for wing loading.

By matching optimum values of wing loading with optimum choice of flight speeds, the ultimate possible effective cross-country speeds are determined as a function of the meteorological conditions.

The use of optimum flight speeds to determine optimum plan is the first step, even if mechanical, and a plus made for a better understanding of the use of lift glide by applying the wing loading to best suit the existing meteorological conditions.

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could not do so depend on keeping the boundary layer laminar.

► **Flow Separation Ahead of Blunt Bodies at Supersonic Speeds** (TN 2485) —by W. K. Moeckel

This paper contains the flow pattern ahead of a blunt body for the case of a various supersonic stream and for the case of non-zero values of stagnation pressure, such as a boundary layer or a wake. The author deduces from experience flow considerations that the form of a blunt air region outside of boundary layer or wake should be a wedge for two-dimensional flow and a cone for axially symmetric flow. The purpose of this paper is to provide the nature of the supersonic flow that determines the size of the supersonic region, and the least beyond which the supersonic cannot exist.

Quantitative analysis of the flow around the fore body Mach number, there is a maximum relative body thickness beyond which supersonic regions cannot occur. The maximum thickness is large for high Mach numbers but of appreciable size for a Mach number of 1.

Quantitative agreement was obtained between analysis and experimental results for the Mach number range of 1.75 to 3.02 in the case of two-dimensional flow against blunt bodies rounded on a flat plate.

► **Evaluation of the Reduced-Mass Method of Regressing Wing Lift Data in Free-Fall Drop Tests of Landing Gears** (TN 2486) —by Benjamin Mandelkern and Dean G. Longford

The adequacy of the drop test as a design criterion for landing gear has been open to question because of the non-representativeness of aerodynamic lift forces. Current assumptions, assumptions present drop tests to be conducted with reduced weight as a simple means of approximating the effects of wing lift during landing. The use of the drop-gear weight is selected so that the lift ratio is equal to the ratio in an infinite landing gear of the same descent velocity.

A small landing gear was checked in the Langley impact basin to check the validity of the reduced-mass method. It was possible to compare data taken from simulated infinite aspects and free-fall drop tests with full design weight to the reduced mass drop tests.

It was concluded that the reduced-mass method of drop-testing landing gear gives somewhat conservative results but it more closely approaches the results of infinite aspects.

If a more exact test history of landing gear behavior is required (such as in the simulation of free-fall by wheel spin), it may be necessary to measure wing lift by mechanical means.

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## Faster Reacting Autopilot for Speedy B-47

- Control time is cut for bombardier over target.
- Gives enemy less time to 'zero-in' on bomber.

By Philip Klau

The Air Force's new Boeing B-47 jet bomber should be safer from enemy fighters and flak as a result of recently achieved improvements in its automatic pilot. These improvements also mean that today's 500 mph. bombers should drop their loads more accurately than could their World War II predecessors, which flew at less than half the speed they do.

Major factor in the decreased vulnerability and improved bombing accuracy is the quicker action response of the new B-47 autopilot. This makes it possible for the bomber to approach its target more slowly, using precise action, before being committed to a straight and level bomb run by its bombardier.

Setting Goals—When a bomber is on its bomb run, it must maintain constant speed, altitude, and heading. Once mission fighters see that a bomber is so committed it is much easier for them to plan and conduct their attack. For the new bomber, a ground-based anti-aircraft radar/missile finds its job much easier when its target must follow a "stiff" flight path of flight.

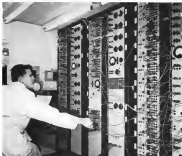
By reducing the length of time required by the automatic pilot (under bombardier control) to make necessary changes in altitude or flight path, the bomber's commitment can be delayed. Furthermore, last-minute changes in attack or flight path can be executed more quickly to place the bomber in the proper position at the time of bomb release.

Being Safe, for example, that a 5-deg. change in bomber heading now takes only half as long as it did previously.

B-29 Experience—During World War II, B-29 bombers that were at full speed and climb by suddenly slowing down during enemy attacks. When the fighters saw the bomb-bay doors start to open, they had advance warning that the B-29 were on their bomb run. This "give-away" proved so serious that the planes were clothed with pneumatic



NEW AUTOPILOT should make the B-47 a less vulnerable target for enemy fighters and flak during bomb run. Bomb bay doors, shown open, are extended hydraulically.



ANALOG COMPUTER, shown being converted up by a Boeing engineer, is used as an aid in solving some of the extremely B-47 autopilot-airframe interface problems.

devices for split-second operation of the bomb bay doors.

Not Free—Speeding up the response of an automatic pilot isn't as simple as it sounds. Inexpensive response is built without careful attention to the overall bomber autopilot bomb height system performance, could result in unstable or erratic operation. The newly announced improvement is a result of an intensive program begun in 1948 by Boeing Airplane Co., working with the Air Force and

autopilot manufacturers, including Sperry Gyroscope Co. and Minicor Appliance Manufacturing.

Previous analytical studies of the replacement performance under varying conditions, now made using analog computers and flight control simulators. These simulators are usually lacking devices such as hydraulic actuators, springs, linkages, hydraulic actuators etc., to duplicate faithfully the airplane's flight control performance



AIRERIN CONTROL, includes B-47 rotary hydraulic servos, bearings, splines, electrical splines, fuses against which autopilot uses actuator inputs.

about its yaw, pitch, or roll axis. A separate simulator is constructed for each axis. When used with an autopilot, these new servos direct the control servos, and in many computers, Boeing engineers can determine accurately what effect on B-47 performance will result from changes in autopilot characteristics.

CPEI sense GFE—Civil account, USAF has furnished autopilots to various manufacturers, telling them which type to use. This practice has been overruled in the case of the B-47, where Boeing is buying an autopilot of its own selection, subject to USAF approval. The complexity of integrating the engine, autopilot, and bombight equipment in a high-speed jet bomber probably led to this decision.

The first of Boeing's autopilot tests was made on a modified Hercules' E-6 autopilot. E-6s are currently used on B-47s. Boeing's decision to switch to a Sperry autopilot for the B-47B may in part have been influenced by a system integration problem. Sperry also built the bombight for the B-47B. Their selection in the autopilot system would appear to simplify Boeing's system integration problem.

The most extensive Boeing tests were conducted using a Sperry autopilot. The Air Force uses a standard Sperry E-6 autopilot on most of its bombers and transports. However, the Sperry A-12 (the entire autopilot which was developed from the E-6) was found to be a better starting point for the advanced autopilot required for the B-47. The improved autopilot is called the A-12D.

Modifications to A-12—Modifications to the A-12 design include the use of a new type inputs in all three axes. Sperry had previously used such inputs

to provide "phase lead" in their World War II Type A-5 autopilot. Another change was the addition of a rate-of-change of altitude input to the boom's altitude control, to eliminate the control's tendency to "pump."

It appears questionable whether the newly developed A-12D features will be incorporated into existing airline A-12s. The light installation required for bombing, with structural drag more, but engineers, would hardly provide a profitable rate for airline passengers.

After three years of intensive study and considerable airplane improvement work, Boeing still feels that there are a number of automatic control problems to be solved. In spite of this, Boeing was that bombing accuracy through the automatic pilot has now reached the highest point in history.

## Miniature Planes

### Aid Antenna Study

Lockheed Aircraft Co. is conducting research on dual-type antennas using miniature airplane models supported on a 10 ft. tower. The models, light aircraft emulators on Super Glider, trans. The lock antennas are designed to replace existing extensive antennas.

The small models have radio-down from antennas installed in a 10 ft. tower. 500 ft. altitude for different aircraft. Locked in this state to limit out the most promising type of antenna design at considerably less expense than would be required by flight tests. Presumably the most promising design is given flight tests. The tower installation and purpose are a part of the expanded Lockheed electronics laboratory.

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## PRODUCTION

### Mill Will Speed Tapered Sheets

New rolling mill will mass-produce sheets up to 19 ft. wide and cut time and chip wastage of slab milling.

By A. H. Longpré\*

A new rolling mill will speed sheet production by the middle of 1953, will be able to mass-produce tapered sheet up to a width of 19 ft.

Currently in the construction stage, the mill will be a 34-in. high, reversing unit. It will have precision screwdown mechanisms and controls. Maximum sheet thickness will be 1.5 in., maximum thickness will be 8.650 in. Maximum taper rate will be 4% in one with a maximum taper rate of 0.001 in. per ft. The maximum gauge tolerance will be pegged at plus or minus 5 mils.

Involved in development of the mill were Air Material Company, Reynolds Metals Co. and Aluminum Company of America. When the mill is built, it will go to Alcoa, which developed the controls, in use at its Davenport, Iowa, works. AMC has set aside \$5 million for the project.

Working Slab—In current sheet design practice, the slab stock is highly stressed, load-carrying member. However, these stresses are not evenly distributed over the entire surface of the wing, tail or other component, but are higher in the leading edge area and increase in magnitude toward the trailing end.

It was only logical, therefore, to consider using a size of variable thickness—that is thicker at the area of high stress and thinner at the area of low stress. Earlier attempts to meet this condition, made use of standard constant thickness sheets of different gauges. This was not satisfactory because it introduced a number of undesirable joints, and complicated the buying of sheets of different thickness by requiring either a filler or an offset beam. Besides, this procedure did not achieve the maximum weight economy desired.

Further Attempts—The next step was to fabricate the slab out of sheets which were individually tapered. Since no method had been devised for producing tapered sheets, it was necessary to machine them out of straight sheets or plates on large slab mills. For a typical rolled tapered sheet, the volume removed

closed off and converted into chips can weigh up to 40% of the original sheet. While this method produces usable sheets, it has many disadvantages: the machining operation is very expensive in man and machine hours, scrap loss is high, there is difficulty in collection and return of chips, and deformation of the cladding on one or both surfaces.

In spite of such adverse conditions, three sheets proved that the use of tapered sheets around the desired combination of maximum strength with minimum weight. A comprehensive survey of the potential usage of tapered sheet was made, with the result that the economical production of such sheets in commercial quantities was considered highly desirable.

A review of possible methods for quality production led to the decision that rolling would best meet the demand at lowest cost and with minimum capital expenditure.

Adaptation—It was determined that a conventional rolling mill can be used, in which the operation of the roll screwdown mechanism is synchronized with the roll mill velocity. This means that the control system must operate in such a manner that the speed of the screwdown motor is in a constant predetermined ratio to the speed of the mill drive motor.

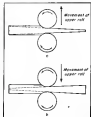
The speed mill roll then moves up, down or downward at a constant rate relative to the velocity of rotation of the rolls. Evaluation of a number of different methods for accomplishing this condition reduced three possibilities: hydraulic, electronic and electric.

In the hydraulic method, a variable screwdown pump is geared directly to the main mill motor, so that the hydraulic fluid output is in exact proportion to the roll speed. This fluid is fed through a suitable manifold of check valves, orifices, and return passage to a master control cylinder. From here it goes to a main cylinder and diaphragm located between the pressure block and roll chuck at each helioid screw. A mechanical needle provides accurate control of fluid flow to main or lower the roll head according to the taper required in the particular sheet which is being rolled.

In the electronic method, an elec-



SLAB MILLING gives advantages of tapered sheet, but is expensive and may cost 40% of volume in chips (closed section).



ROLLING the taper should be cheaper, can be done from the thin end to the thick (top) or the thick end to the thin (bottom).



CYCLE ROLLING is a long step, by only off at high and low points, can be used to give large number of tapered sheets.

tronic fluid on page (formerly used to maintain constant thickness) is arranged to control the up or down movement of the roll in proportion to the speed of the sheet passing through the rolls.

In the electrical method, a variable voltage generator is directly connected to the main mill motor. Current is generated across through a series of inductors, capacitors and bridge circuits so that the rollings delivered to the screwdown motor is directly proportional to the roll roll speed. The setting of the potentiometer rheostat determines the speed of the screwdown motor, thus controlling the taper of the sheet being rolled.

First Process—Initial pass was made on a 20-in. pilot mill, starting with soft alloy (55) stock, followed by 345

\*Editorial Board, Air Material Company, Winton-Palmer, APT, Dayton.

both bare and clad. Tests showed that the direction of rolling made no difference in the quality of the finished sheet. Rolling can be from the thick end to the thin with downward movement of the top roll, or in reverse.

Cable rolling of a long strip was accomplished so that it was not necessary to cut off at the high and low points to get a large number of rods uniformly tapered sheets. While all work done so far has been with straight low force tapes, there is no reason why it should not be possible to produce multiple or compressed tapes.

It must be understood, however, that roll tapering of sheets will not eliminate all machine wear or replace dies. There are some areas, not capable of being rolled, where a certain amount of machine work, or cautious set, must be done. By starting (out) with a sheet already rolled to the basic taper, most of this extra machine work will be eliminated. What little remains can be done on smaller machines with great saving in floor and machine hours.

► **Practical Use**—Before the experimental work, on the job it was not planned, the practicability of rolling tapered sheets was definitely established. A production roll was set up to roll five sheets up to 48 in. wide, suitable for use on high-speed lighters screws. A little later another roll was put into operation to roll heavy interior

sheets or plates up to 76 in. wide, for use on wooden formwork. Both rails are rolling 735E alloy, clad on both sides, with excellent results.

An interesting feature of softboard sheets is the fact that the shoddy maintains an exceptionally close percentage thickness ratio to the core material regardless of sheet thickness or degree of taper.

A summary of results attained so far indicates that duration of the thickness locus a theoretical linear taper can be held as close as plus or minus one and one-half mils per inch. The resultant taper is independent of roll speed, percent reduction, rolling sequence or starting gauge of the sheet. Limitations on width, range of gauges, and lengths of sheet are the same as in conventional sheet rolling, and are not dependent on the control system used.

► **Properties**—Spontaneous taken from men along the entire length of the ducts show mechanical properties well within specification limits for the alloy and temper under consideration. Microstructure of tapered ducts is similar at every segment to that of normal diameter rolled ducts.

Microradiographs are similar to normal slabs except that the grain size varies from the thick to the thin end, due to the varying cold reduction throughout the length of the sheet.

Strengthening or flattening of tapered

shorts in the sac problem which has not yet been completely solved. Shorts measuring 0.100 in. or more in thickness can be acceptably flattened by

roller leveling or stretching. However, stretching must be done with extreme care because deformation of the sheet may alter the original tape ratio. The higher gauges (3.950 to 5.840 in.) have not been planned to decouple bolsters with existing mill equipment, and generally require additional work to render them acceptable to an end loader. Work has been started to develop a high pressure roller leveler, and also to investigate the possibility of localized stretching.

► **Increased Demand**—As the production and use of rolled tapered sheets has progressed, the demand for larger sheets has increased. One aircraft manufacturer has made sheets 100 in wide x 400 in long by machining them out of large heavy plates. It has been indicated that sheets up to 120 in wide would be desirable, if such a width can be made.

A further check on future aircraft requirements was coordinated with the major producers of aluminum sheets. As a result of this survey, contracts are being drawn up to install a 34-in. 6-high covering roll to produce sheets 150 in wide. This roll will be equipped with precision screwdown mechanism and controls.

When this new rolling mill gets into production, probably by the middle of 1955, all known sizes of tapered sheets can be turned out on a mass production basis. Aircraft designers can take full advantage of the weight and cost savings provided by rolled tapered sheets, with confidence that mill capacity will be available to take care of their requirements.

## North American Expands at Fresno

North American Aviation's new Fresno, Calif., facility will be geared to cope with future modification requirements for new military aircraft.

"It won't be known now how large the F-16 program will become but as a replacement of future loss, North American has proposed to the Air Force that additional buildings be considered for the program as it develops."

In addition to the F-5E, NAA produces the Navy A-1 Savage and sees some use in production of that service's sweeping, curvate-tailed F-2 Vay fighter. It is the Italian that is making the T-25 and T-6C Terns. A low-power attack gunner and guided missile work contribute other phases of the company's activities.

Total employment at all MAA facilities is about 15,000.



## A TRAINER GETS ITS WINGS

Production task is Lockheed's T-35 seven-blade rotor. Main fuselage section supported by overhead crane is lowered onto pre-assembled wings waiting in making 70 Lockheed comments less than 2 months ago.

members but tea holes and making of knee  
wires and tube connections. In these wheel  
ring tools. The next steps will be attach-  
ment of landing gear, tail section, and  
grounding.



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## EQUIPMENT



SEVEN DC-6As freighters have been ordered by Flying Tigers. Total cost: \$7 million.



F-105A used for experiments with water injection on F4W II 2000 engines.

## Tigers' Fleet Doubled in Year

Purchase of seven DC-6As will bring freight airline's plane total to 44; overhaul facilities, shops expanded.

By George L. Chenoweth

**Fullbrook, Calif.**—Flying the freight is big business. The Flying Tigers, proud of its claim that it is the world's largest freight and contract airline, recently announced "the largest single purchase of new cargo planes" (AVIATION WEEK, Oct. 20, 1952, p. 70)—seven DC-6As costing over \$7 million. This will bring the Tiger fleet to 44 planes.

- Fleet size is still small.
- Fleet size was doubled during the last year.
- Traffic has tripled.
- Load factor jumped from 78.2% to 82.1% in June, 1952, percentage was 94.6.
- Shops and overhaul facilities space have expanded 100% and a new hangar has been put into operation.
- Capacity for outside customer work has been expanded.
- Manpower has been more than doubled—current machine work alone now does over 700 tons.

The Flying Tigers fleet does not confine its activities to flying freight and contract operations. Its main base here is a Civil Aeronautics Authority approved overhaul base for all aircraft activities except the overhaul of engines and propellers, according to Al Gold, boss, the Tigers' superintendent of maintenance and, by adding, the air line is strong belief to become completely self-sufficient by broadening its activities to include these jobs which it now has to farm out.

• **Major Power**—Since the airline operates a fleet of 20 C-46s and 11 C-54s, it has a very old interest in supplying every bit of horsepower out of its aircraft propellers. The need for new main power is underscored by the fact that the Tigers operate the planes with heavy loads out of such high altitude fields as Stapleton in Denver, where the C-46 can be critical when taking off on hot summer days.

So the company is concentrating very active attention on its Pratt & Whitney

R-3400s. At the experiment works, it will be the first ADI installation on that model engine mounted on a C-46, according to F&W.

Goldberg told AVIATION WEEK that his company was working high-level and state power. After the ADI system, he hopes to show a 10% increase in the engine's 2,800-hp output and 7,700-lb. thrust power.

As the Tigers have moved as passengers and finally test cell to conduct the necessary proving runs on the engine, it obtains FAA type inspection documentation for the new ground and flight test power of the engine.

The engine enclosed a powered, discarded 1.47 to the test cell to act as a test bed. The test engine had a large, more, will mount 30 thermocouples, use an air duct with plug and size of the base or work level. Two no-groove carburetor will accommodate water injection.

• **Lowest Ready**—The Flying Tigers were the first to enter into a "Lowest Ready" program with the Civil Aeronautics Authority, according to Paul Giese, the carrier's Chief Inspector.

Under this new way where the company worked out with its engine overhaul agency, the Tigers pay the agency \$1.00 per hour for the engine operation after overhaul, and no additional with the same amount of a full-time work and scheduled period (1,190 hr.). That, if an R-3400 should fail 100 hr. before an next period, the carrier would receive a \$1,000 credit.

- **Advantage** claimed for dual system.
- **Overhaul** jobs can be predetermined with ease, facilitating setting up accurate engine loads.
- **Overhaul** agency becomes increasingly timely concerns, resulting in better operation.
- **Coordination** and cooperation between engine and overhaul agency are greatly improved.

The release is now in fairly general use throughout the engine overhaul industry.

• **Around the Stage**—The Tigers have developed a back-lighted maintenance panel for the C-46 with which appearance is being maintained. Red light is used.

• **Task saving**—Considerable success has been achieved with inspection-type fuel tank testing. To repair water leaks, a 10-in. hole is drilled through the outer skin in the vicinity of the leak.

A water-dipped, quick-drying, thickened compound (Prochem Research 518) is forced through the hole in the skin between outer and inner skin or between skin and structure. Compound dries quickly and effectively stops most leaks.

• **Analysis**—Analysis, both the Scientific method and the Sperry engine types, are under scrutiny by the Tigers.

They C-46s have been used for the possible Scintilla unit which is currently being evaluated, according to Goldberg. The Sperry engine analysis is being conducted on an automatic installation for the airline's new DC-6As.

• **Engine**—The carrier's R-3400 C-46 engine will undergo modification from the -7 to the equivalent of the -11 model. Goldberg said that the credit will be a 100-hp increase per engine, making the plane's output weight to be increased from 70,000 to 75,000 lb. Underline on C-46 is a high 117 lb. • **Seating**—The airline operated what was probably one of the highest-density aircraft in existence last year. It reported 190 seats in a DC-4. Subsequently, the CAA limited the number of seats allowed in a DC-4-type aircraft to 81.

• **Construction**—The carrier recently received a plane job (which had belonged to President Abraham L. Minkoff) to a utility craft. She had two drive shafts, some gear, and some orange spiral strand in the main drive, originated, but, and was finished off in rich blacked vacuum.

• **Loading**—A large metal pallet of 6,000-lb. capacity to facilitate loading was built by company personnel. The pallet is mounted to plane level by a special lifting track to expedite loading and unloading. The entire load of the pallet-holding construction is a great time-saver.

• **Painting**—C-46 engine being as available. Tiger maintenance crews have had to build up in the engine room, severely the plane's oil control surfaces and main tube.

As unusual maintenance costs at the Tiger's overhaul base, every engine working for the airline had previously worked in a machine on the floor, according to company officials.

• **Block & Tackle**—Goldberg finally describes his company's job as a "rough and tumble operation." It is the fact that the opening a freight line is tough on equipment. The plane took a terrific beating which is noticeable when handling heavy, heavy cargo. Yet the carrier has an 11,000-lb. crane had gone on its C-54s and 8,000-lb. on the C-46s.

In the air freight business, you run a marginal operation with no capital loads. Some of the most popular cargo loads handled by the Tigers are motor trucks (before volume, incidentally, an average approximately 2,514 lb. to 457,274 lb. the last year), bananas, sweaters, electronic equipment, cosmetics and toilet preparations, drugs and bedding, live stock and wild animals.

The airline notes that in a typical day with the Tigers:

- 12 aircraft flying the domestic freight routes, coast-to-coast.
- Six aircraft participating in the Pa-

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- Two aircraft on military and freight charters from the United States to Alaska and from Milwaukee to Twin Falls
- Four planes shifting "vehicles" from California and Texas back to Mexico under an arrangement with the government
- Other aircraft in overhaul

## New Precision

### Air Speed Meter

A new precision true air speed meter has been put on the market by Norden Instruments, Inc., Milford, Conn.

Developed in conjunction with a local division agency, the existing model has an operating range of 150 to 650 knots, with a corresponding Mach range of 0.2 to 0.9. Extension of these limits are contemplated by the company. Accuracy of meter does 4 knots is claimed for the unit.

The manufacturer says that the high accuracy of the instrument, coupled with ease of installation, make it ideal for use in guided missiles, flight test instrumentation and aviation research.

• **Visual Scale:** The Norden true air speed meter weighs 27 lb. Dimensions are width, 10 1/2 in., height, 7 1/2 in., depth, 15 1/2 in.

Input requirements: 115 v ac 60

Hz, 25 w, 3 ps 175 v dc 40 w, 40 v, 25 v dc, 20 w.

The meter includes, as a completely separate component, an externally actuated static venturi and is constructed at temperatures from -59C to +79C and has an accuracy of  $\pm 1.50$  ft per 5,000 ft, according to Norden.

## IBM Card Speeds

### TWA Ticket Sales

One of the principal sources of airline passenger growth has been studied by Trans World Airlines. Passenger time at the ticket counter, which can be long-drawn out if the industry is congested, has been reduced 50% by using International Business Machines' punched tabulating cards at ticket, the airline says.

Conceived and developed by TWA's Controller Department, the ticket has been used at the airline's ticket office in Kansas City on a trial basis since last May and is reported to have won approval of the sales and operations sections.

An added advantage of the ticket, says TWA, is that its use brings about economies in all departments processing sales reports and ticket information.

• **Expedited Data-Key:** to the speed up in the information presented on the ticket showing time and to point, here, the total record of sale, supplementary data such as crew, airway or connecting, ticket number control, ticket form, etc.

Ticket agent now merely selects the proper ticket form, writes in the passenger's name, confirms flight number and checks the type of sale.

A second card, containing identical information, is sent to Accounting,



### P-40 FIRE TRUCK LAYS DOWN FOAM BLANKET

Port & Whitney Airways' new fire truck goes into action to "lay" an extensive blanket from the rearview of a P-40 fire truck. Truck has just laid down a foam-blanketed path through a raging fire to prevent serious spread in tank, the plane was used in a test of the new machine, according to PWA. After tests have been completed, the flight

concludes on assuming the truck can generate 9,000 gal. of foam by itself and can double this with the aid of a "new" truck. "Newer in tanks and head lines can deliver high-flow straight stream of foam, water being in a straight stream of foam." Under-chassis machine discharges foam or water, developed by Richardson Specialties Co., Waukegan, Ill.

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TWA has, to date, conducted tests on only a small number of stations but expects to expand use of the IBM ticket soon.



### Fast Starter for Nene 4 Turbojet

A new, lightweight, replication starter for the Rolls-Royce Nene 4 turbojet aircraft engine has just been put on the market by The Henry Co., Bland, England.

A cartridge type unit, it stores its "shots" which permit three starts to be made without reloading. Total energy output is 64,000 ft. lb., delivered in a working period of two seconds. Henry says that one of the big advantages of the unit is the amount of vibration given to the engine. It is at half idling speed in under ten seconds.

Firing is accomplished by depressing a button on the starter control panel. The unit regulates the sequence and timing of each operation as closing the throttle by two when the engine has attained idling speed, and prevents damage if starter is actuated when engine is burning at high speeds.

Cartridge gases are directed through two diametrically opposed nozzles to counter-rotating turbine wheels. Peak speed of the turbine is 15,000 rpm, giving an output shaft rpm of 8,750 through reduction gears.

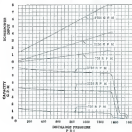
A multi-plate clutch is incorporated to absorb peak loads at moment of engagement of starter to engine and an overspeed device protects the machine in case of drive mechanism failure. Built-in oil pump lubricates the bearing.

The Henry Co. believes it has solved one of the most difficult problems in cartridge type starters—obtaining reasonable life from the turbine blades. On a test basis, a unit was subjected to 170 shots without replacement of a single vane component. This is three times the allowed type test operating limits, according to the manufacturer.

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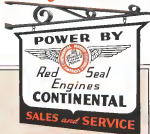
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## Non-Toxic Dy/Chek

An improved Dy/Chek formula, reported to be non-toxic, has been developed by Tuxco Products, Inc.

The product, a dye penetrant for detecting cracks in aircraft and other parts, is the outgrowth of a previous Dy/Chek formula developed some time ago for marking parts in the factory or the field. In addition to being non-toxic, the new formula dye is said to be a more sensitive inspection medium than its predecessor.

Advantages claimed by Tuxco for the Dy/Chek process are its low cost, application to both ferrous and non-ferrous metals, portability and accuracy. The process requires no special equipment. It can be applied to parts by spraying, dipping or brushing.

Tuxco Products, Inc., Terminal Avenue 1049, Los Angeles 24

## Plastic Plane Parts

Development of single, new polycarbonate resin expected to find valuable use as lightweight, heat-resistant aircraft parts, has been announced by American Cyanamid Co.

Cyanamid's engineers say the new plastics don't lose strength even when exposed to temperatures of 500°F for a full day. Under these conditions, the resin scratched by glass cloth, gave a tensile strength for a 50,000 to 55,000 psi. Best heat molding products can do it 15,000 to 20,000 psi on initial exposure to 500°F temperature, they claim.

The improved performance is made possible by using triethyl cyanate, basic element in the plastics. A monomer recently developed by the firm, triethyl cyanate is now available to manufacturers for pilot plant use.

The rugged plastics will be marketed in three types: PDL 7-528 ground-purpose resin, PDL 7-529 self-extinguish, fire-resistant resin containing aluminum trioxide, and PDL 7-579 crystalline resin for expurgating suit or cloth.

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## AIR TRANSPORT

### ANDB to Test Airborne Radar Beacon

- Transponder unit sends signals to ground.
- And controller can see signals on radar screen.

By F. Lee Moss

This month CAA's Technical Development and Evaluation Center at Indianapolis starts to evaluate a pre-production model of the radar safety beacon, built in Air Navigation Development Board specifications.

Airline and military services plan to understate versions of this airborne beacon as soon as they find it meets their requirements. A committee of civil and military men has planned the CAA evaluation.

The beacon is technically called the Rho Theta airborne transponder. It is on plane when it flows up, down, height and identified on the traffic controller's radar screen, airborne planes without such beacons are extremely difficult for ground radar screens to spot and identify.

• Radar Control—New models have been delivered by Washington to CAA at Indianapolis and one to Air Force's air traffic section at Wright-Patterson AFB.

Airline, CAA and the military are working toward radar traffic control of all major airports. An ATCA official says this radar safety beacon is the main development that will make completely radar-controlled airport traffic possible.

Here's how the transponder works: It's an elaborated version of the World War II identification system called IFF (Identification Friend or Foe). When ground or ship radar sends out a pulse, it triggers an airborne response. Thus the airborne transponder transmits its own signal back to the ground radar receiver.

The ground radar controller sees on his screen whatever the plane's transponder sends. It can be a simple signal, merely stronger than that of another non-equipped plane or the transponder can be elaborated to send more than one type signal, depending on pilot selection.

• More Later—The basic identifying feature when the pilot hits his microphone to talk to the ground controller, his transponder sends a special signal.

### Projects Sponsored by ANDB

PROJECT	ANDB NUMBER	INTERESTED AGENCY	CONTROLLER OF NAVY FACILITY
Air Traffic Controlling Document	1-1	CAA	Experimental Station, John F. Kennedy, New York and San Francisco
Radar Safety Beacon	2-1	NAVY Bureau	Washington, Bureau of Naval Affairs, Bureau of Aeronautics
Identification and Communication in Measurement	4-1	NAVY Bureau	Naval Air Station, San Diego
General Air Traffic Control Document	4-2	CAA	Naval Air Station, San Diego
First Approach Visibility Station	4-3	NAVY Bureau	Naval Air Station, San Diego
Establishment of Air Force of the Traffic Control Unit	4-4	CAA	Naval Air Station, San Diego
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NOTE: Special report from Navy after completion of detailed technical or scientific study project. 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MARTIN 404 sports noticeably dihedral on main wings and tail, its engines feature extended scoops on lower right sides . . .



MARTIN 404 has bluntly tapered vertical tail, its extendible fuselage along trailing in wing leading edge . . .

#### How to Tell Them Apart:

### This Is the Martin 4-0-4 . . .

On Jan. 15 Trans World Airlines and Eastern Air Lines put the new Martin 404 twin-engine transport into scheduled passenger service. By mid 1953 the two carriers expect to have 100 of the planes in use.

The Martin looks very much like its only competitor—the Convair 340. A brief recognition guide has been prepared by Anthony Wayne to help you recognize each of the modern two-engine transports.

Although the Martin 40-4s and 20-2s look much like the Convair 340

MARTIN 404 wing has nearly equal taper in plan, passenger cabin has 18 windows

and its covering resembles the 340, there are some basic differences.

• **Side View:** Chief impression is that the whole Martin tail is stubbier and bunches up and forward more than the Convair, tail cone of which is symmetrical and the rudder lines back in stead of forward. Landing on ground they're easy to tell, as Martin steps drop down from bottom cow, while Convair's come out of side ahead of wing.

Martin horizontal stabilizer is atop the tail cone and its sharp dihedral, while Convair's is in middle of tail cone and is flat. Convair engine nacelles have jet exhaust stacks on top of wing and project slightly behind wing trailing



CONVAIR 340's dihedral is less apparent, horizontal tail is conventional. Engines are more smoothly and cleanly covered.



CONVAIR 340's vertical tail is more trapezoid, vertical fin is shorter, trailing rear steps more sharply than 404

### . . . This Is the Convair 340

ing edges, while Martin nacelle tapers into wing before reaching the flap.

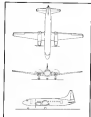
Martin has projecting air scoops under the wingtip and under and atop the engine nacelles, while Convair's housing bottom and engine nacelles are smooth. Also, Martin has projecting flap-lugs under wing, while Convair's flaps are not noticeably from side.

• **Front View:** Sharp wing dihedral of Martin wing appears to start outward of engine, while Convair's dihedral is constant from wing root. Again, Martin horizontal stabilizer has dihedral and is atop the tail cone, while Convair's is rounded and is flat. Projecting air scoops and flap-lugs of Martin

are noticeable, while Convair looks clean. Martin engine nacelles are round, with projections, while Convair nacelles are sharp but clean.

• **Plan View:** Convair tail cone projects behind horizontal stabilizer. Convair wing appears to sweep forward due to more rounded trailing than leading edge, while Convair's appears to sweep off due to tapered leading edge. Martin engine nacelles droopdown in wing, while Convair's project behind the wing.

CONVAIR 340 wing has decided sweep to leading edge, cabin has 18 windows.











## COCKPIT VIEWPOINT

By Capt. R.C. Balaban



### Action on Accidents Needed

The most recent air tragedy—American's Convair at Newburgh—brought to a state of protest from all quarters—the public, aviation people and Congress—concern for its safety, or even the lack of it, has already built up over the past 12 months with each succeeding disaster. This latest one has set off all the speculation.

There is little to say about the Newburgh accident at this early date. Most important clue is that the airline appears to have descended suddenly at an abnormally steep angle—15 degrees—from an altitude of about 800 ft. Prior to the start of this dive the plane had been making a normal ILS approach with radar monitoring. Weather conditions were poor, consistent with reported moderate turbulence.

All navigation facilities and landing aids were apparently in normal operating condition when other aircraft made routine approaches before and after the crash. These various checks and facts indicate trouble within the airplane.

**Instrument Reliability**—The fact that several recent accidents have occurred during instrument approaches has created widespread apprehension over the reliability of existing landing aids. As far as we have determined there is no connection between any of these episodes. No new flaw has been discovered in ILS, GCA, cockpit instruments or any other gadget. Bad luck and coincidence are the only alternatives.

That reliability is going to stay as a defense doctrine and say "This is it," is frustrating. The lay public does not understand why it cannot be done. They demand action—regardless. On the other hand, those within aviation circles are overwhelmed towards complacency. Obviously, neither approach is entirely correct. Now with a congressional investigation underway, the public accused, and aviation people concerned, this may lead to a good final fix action.

**Procedural Action**—I want this action, and it must be intelligent action, we need a high level, honest and objective air safety committee. Much as we deplore the establishment of another "high level aviation committee" there seems to be an alternative. This group could be appointed by Congress as the President, or it could be an independent gathering of aviation veterans.

It will take considerable tactfulness to bring one man off that is what these aviation people might be required to do.

Can this be done? We don't know. It hasn't been done in the past. These concerned with accidents and safety have been more concerned with clearing their own names and less concerned with being objective and thorough in their reportings. The very nature of the American Iron CAUSE has placed these organizations in some impossible situations and makes outward feelings a mystery.

Spent time and money to get the bottom level of news from a sample of the items which should be investigated. There are some:

- Civil Air Regulations: Present rules especially those concerning the legality of landing over the areas of congested numerous.
  - Transport "C" category. This has become an elusive band to squeeze the last ounce of blood from an airplane rather than a set of safety specifications.
  - Instrument approaches. Weather thing, especially in congested horizontal areas, is entirely too complicated.
  - Visual aids. There is still an enormous chasm as to what is needed as the way of approach lights.
  - Weather minima. Determine if the present system is adequate.
- Sufficient to say that many other items need serious. The time for action on these is now.

## WHAT'S NEW

### New Books

**Manual of Aviation Laws**, by Thoro-dore Mattina and Anne J. Mattina.

This is a compact yet easily consulted compilation of important laws and regulations in effect today.

The 97-page booklet, prepared by two members of the New York Bar, is based on data collected from authoritative sources, and starts with fundamental definitions, progressing through development of aviation law, aviation and pilot certification, airways, customs, airports, traffic rules, aircraft types and equipment, air carrier certification and rights, international conventions and flight requirements, state legislation, and a list of selected U. S. Government publications on civil aviation. (Dennis Publications, 45 W. 36 St., New York, 11, N. Y., unnumbered telephone, \$1.00, clothbound, \$2.00)

### Telling the Market

Illustrated 16-page directory details Electric low temperature welding alloys, has a two-page chart covering over 100 of the company's different welding alloys. Write Electric Welding Alloys Corp., 172 St. and Northern Blvd., Flushing 35, New York. Latest evaluation data on Skydrol synthetic nonflammable type hydraulic fluid is presented in 20-page booklet, Write Mannesmann Chemical Co., St. Louis 4, Mo.

**Machine Test Data Telling into Computer** Part describes apparatus, the required data used and variables determining wall thickness and surface characteristics of the finished parts. Write Tube Research Corp., Wallingford, N. J. • • •

**Aviation CIRC** 1958 tests picks up, used mostly in aviation and acceleration studies, and how to choose them. It contains applications questions regarding equipment and calculations, a glossary, nature of motion and many of temperature. Address: Consolidated Engineering Corp., 180 N. Santa Maria Blvd., Pasadena 8, Calif.

### Publications Received

• **Atom An American Enterprise**, by Charles C. Park, published by Richard & Co., Inc., 211 Madison Ave., New York 17, N. Y. 10017, 15111. The book says of Charles Martin Smith and Atom, from the late 1930s to the present.

• **Aviation of America**, by Maurice Hed. Includes a preface by James Douglas, published by Doris, Stone & Paine, Inc., 120 Madison Ave., New York, N. Y. 10017, 5101. The first and comprehensive of 11 papers in the specific, engineering and technical fields of aviation.

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Bedway	10 to 18 in.
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Center Capacity	17 in.
Longitudinal Feed	0.001 to 0.010 in.
Threading	0.001 to 0.010 in.

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## EDITORIAL

### There Is Much to Be Done

Official investigations of CAB into the probable cause of the airline accident at Elmhurst, N. J., were moving along at the fastest possible speed last week. A congressional investigating committee was created.

Publics, resulting from the American Airlines-Cowart crash, a tragic consequence following the crash of the scheduled C-46 accident a few weeks earlier in the same city, appeared to be spreading out over the country as local newspapers began wondering, "Can it happen here?" The unfortunate coincidence heightened indignation in the community.

Obviously, the public hearings will be covered in the press as no other air accident hearing has ever been covered. No matter how blameless any company, group or individual may be shown to be, the same distrust and mistrust will pour out over the new news to all parts of the country. It will not be good for commercial aviation.

Efficiency in aviation hopes the crash will be feared, so another such accident can never happen again. Even if such is the case, aviation will find itself with a much bigger public relation problem than it had two months ago—lost only among its customers, but in business areas near major airports.

Up to now, it was the insurance issue. Now there will be some likelihood to create insurance danger. It may be the case, however, that there is no doubt that crime airports could be closed and scheduled if we are attributable enough to experience very many more such accidents in cities.

Airline's greatest advantage is its freedom of air space. But that freedom—we are learning—is its over use and its works on the ground can also become a liability. As aircraft increase, this liability will be regarded as the public to an increasing degree. Death or injury to those in aircraft is bad enough. Harm also to bystanders and citizens on the ground is as much worse.

So we must wait for the official investigations to find the probable cause of this latest tragedy. But we must not wait a moment to start planning how we are going to achieve a better safety record, and how we are going to take voluntary and immediate steps to try to alleviate risk to the public. Thus, once launched on our campaign, we should let the public know we are starting to do something about it. Aviation Week has been calling for an intensive-wide cooperative educational or publicity campaign for a long time, to take the initiative on public problems, such as noise. Now our public problem is suddenly bigger.

### Your Help Is Appreciated

If you were one of several hundred AVIATION WEEK subscribers who gave us your opinion of this magazine in 1951, we say thanks.

Two surveys were made during the year. One has just been completed. Both were conducted by the Research Department of McGraw-Hill Publishing Co.

We have just finished reading every questionnaire returned by both field research interviewers and by you individual subscribers. We appreciate the time and effort you devoted to telling us what you like or dislike about this magazine, or what you would like to see in print.

Fortunately for us, there were some compliments that brighten that brighten are always welcomed when they are honestly written. We received very helpful suggestions from you. As a result, we have a number of ideas for improvements without changing the general concept or format of the magazine.

Although we realize that no one can succeed in pleasing everyone, we plan to keep on trying. And if one of you readers who weren't quoted would like to express an opinion, by all means sit down and let us know how you feel about us. We'll read your stamp.

### Peace—It's Wonderful!

The new, up-and-coming helicopter industry doesn't just pay lip service to truth and cooperation. Its companies really work at it. Maybe this is because of the youth of the industry. Maybe it's because of the youth of its top men—five or six of them are hardly more than 30 years old. Cooperation fits all ages, yet, but first there are progressive, well-educated engineers and business men pulling together for a common cause—to improve the helicopter.

They all know that the sooner the helicopter becomes a simple, economical, and practical vehicle the sooner the industry and all of its members will prosper and prosper.

Tell us, did you ever see anything like this among competitors?

The Miller Copter News, Hiller's home organ, is running a series of guest editorials, some written by presidents of competing helicopter companies. But that isn't all. In the Dec. 15 issue, we found a guest editorial by Charles H. Kassar, president of Kassar Aircraft Corp., a Hiller competitor, paying tribute to that great helicopter pioneer, Igor Sikorsky, who is a guiding light in probably the oldest copter manufacturing in the country, United Aircraft's Sikorsky division. Sikorsky division is the biggest competitor Hiller, Kassar and the rest of the copter industry have to back.

Peace, it's wonderful! And progressive. Instead of wasting time hickering, blocking each other's efforts, these men and the other members of AIA's Helicopter Council—Bell, Dornier, Hughes, McDonnell and Piasecki—are working in a powerful campaign for progress.

Congratulations, gentlemen.

—Robert H. Wood

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